WSDOT Geotechnical Division

Geotechnical Site Visit Report

Project Name: I-90 Hyak to West Snowshed Phase 1B	
Contract No: C7852	Page 1 of 2
Day: Tuesday	Date: October 18, 2011

I met Jerry Dilley (WSDOT's blasting consultant expert from Superior Blasting) at approximately 10:30 am on the east end of the project at the soil nail wall where crews where removing pins that held the blankets over the curing shotcrete from the finished face. Erik Warren (WSDOT Inspector) met us to walk through the project together. We weren't able to see anything new on the soil nail end of the project because the shot rock debris was still bermed against the lower half of the rock face (Figure 1). We had already reviewed the upper portion of the cut during an earlier site visit. See IDR dated August 10, 2011.

Erik, Jerry, and I went down to the center of the project between LW Station 1331+25 and 1334+00 to evaluate the preshear drilling control. During Jerry and my last visit on August 31, 2011, we observed the continued lack of drill control from the preshear lines from the drill hole collar location at the top of the lift to the base of the bench at approximately 24 feet in depth. Routed through Bob Hooker on August 31st, Brad Collier was asked to explain why there continues to be problems drilling consistently straight and evenly spaced preshear lines (parallel and normal to the slope). Brad Collier's response to this request (on September 6th) was that the bushings on the drills were bad and needed to be replaced. He indicated that preshear drilling control should dramatically improve from Bench 3 between LW Station 1331+25 and 1334+00. Figure 2 shows the area where drill control should be dramatically improved from Bench 3 to the upper six feet of Bench 2 between LW Station 1331+25 and 1332+25. We couldn't access the cut to the right because two excavators were working on winterizing the upper bench and they were placing material against the base of the slope from the outside edge of the bench.

Jerry and my evaluation centered on the section that was accessible from approximately LW Station 1331+25 to 1332+25, where there is less geologic structure that may affect drilling operations. We thought this would be a representative section to evaluate the potentially improved performance of the preshear drilling efforts by Western States on Bench 3 and the upper six feet of Bench 2. As can be seen in Figure 3 and 4, the preshear line drill control issue continues to be a major problem. According to Brad Schut and Erik Warren, there have been considerable deductions for preshear lines for not meeting our deviation specification outlined in Section 2-03.3(2) under Controlled Blasting subsection (d). He estimated that between 25 and 30 percent of the holes are out of deviation when they are finally exposed, several weeks after drilling and blasting. In our opinion, Figure 3 illustrates the uneven spacing of the preshear drill holes at the collar elevation, indicating a total lack of effort, or care, to drill preshear lines at the spacing identified in their blast plan or within deviation specification. Figure 3 clearly indicates to us that the geology and drill equipment are not the problem; taking the time to setup the slope angle and properly space the drill holes is the problem. This blast hole alignment problem is not just a visual issue. The poor drill control of the preshear lines is concentrating explosives in the slope in some places and is limiting explosives needed to make a good preshear line in others. This is why the slope has a corduroy appearance. The poor preshear drilling control is resulting

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in blast gases following natural geologic fractures and joints rather than breaking between preshear holes, as intended in our standard specification.

In Figure 4, the large deviations in the preshear lines at the base of the lifts are leaving wide shelves of irregular rock that exceed the maximum of 3 feet, as agreed to in 2010 with the contractor. The irregular bench offset in the LW 1331+75 area is further indication that the preshear holes are not being drilled to our specifications. Although the production blasting has dramatically improved this season, we feel it is unreasonable to let the contractor continue with their preshear drilling when hole alignment control issues are continuing to produce inferior results. We strongly recommend the following contractual enforcement actions be taken by the Region Construction Administration Team for next season:

- Based on the contractors inability to control preshear holes to a depth of 24 feet the last two seasons, we recommend that lift heights be reduced to 12 feet until the contractor is in compliance with subsection (d) and (f). Specification 2-03.3(2) under Controlled Blasting subsection (f) states that "the length of controlled blast holes for any individual lift shall not exceed 20-feet unless the Contractor can demonstrate to the Engineer the ability to stay within the above tolerances (subsection (d)) and produce a uniform slope. If greater than 5-percent of the presplit holes are misaligned in any one lift, the Contractor shall reduce the height of the lifts until the 9-inch alignment tolerance is met." This will require the contractor to submit new blast plans for the reduced height lifts.

- Since the contractor has continually demonstrated that they will not remove the muck from the face of the shot before beginning to drill and shoot additional areas, we strongly recommend that test blast sections (subsection (a)) be fully excavated and evaluated prior to commencement of any further drilling until the contractor can meet the specifications outlined in subsection (d) and (f). Without enforcement of this part of the specification, we will have little hope of seeing improvements to the finished rockslope face.

Jerry Dilley and I left the site at approximately 2:00 pm.

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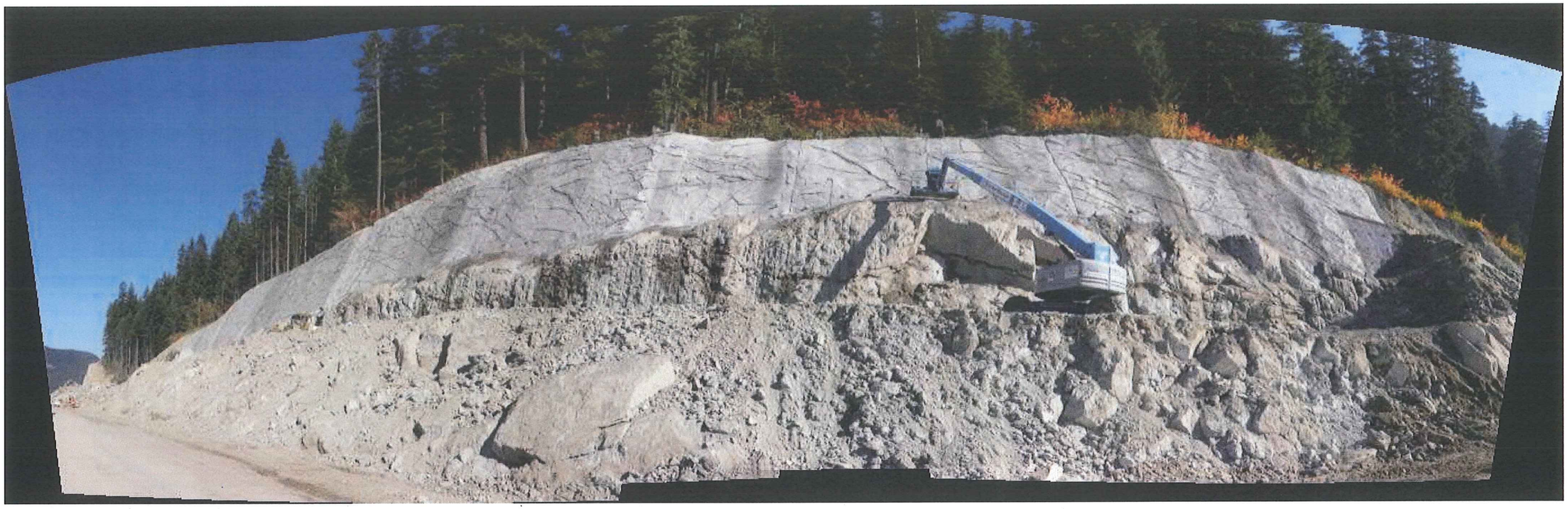

Figure 1. A photograph of the finished, sculptured face of the soil nail wall and the upper portion of the rock cut. The lower portion of the rock cut has yet to be revealed for evaluation, and it appears that the debris won't be removed until next season.

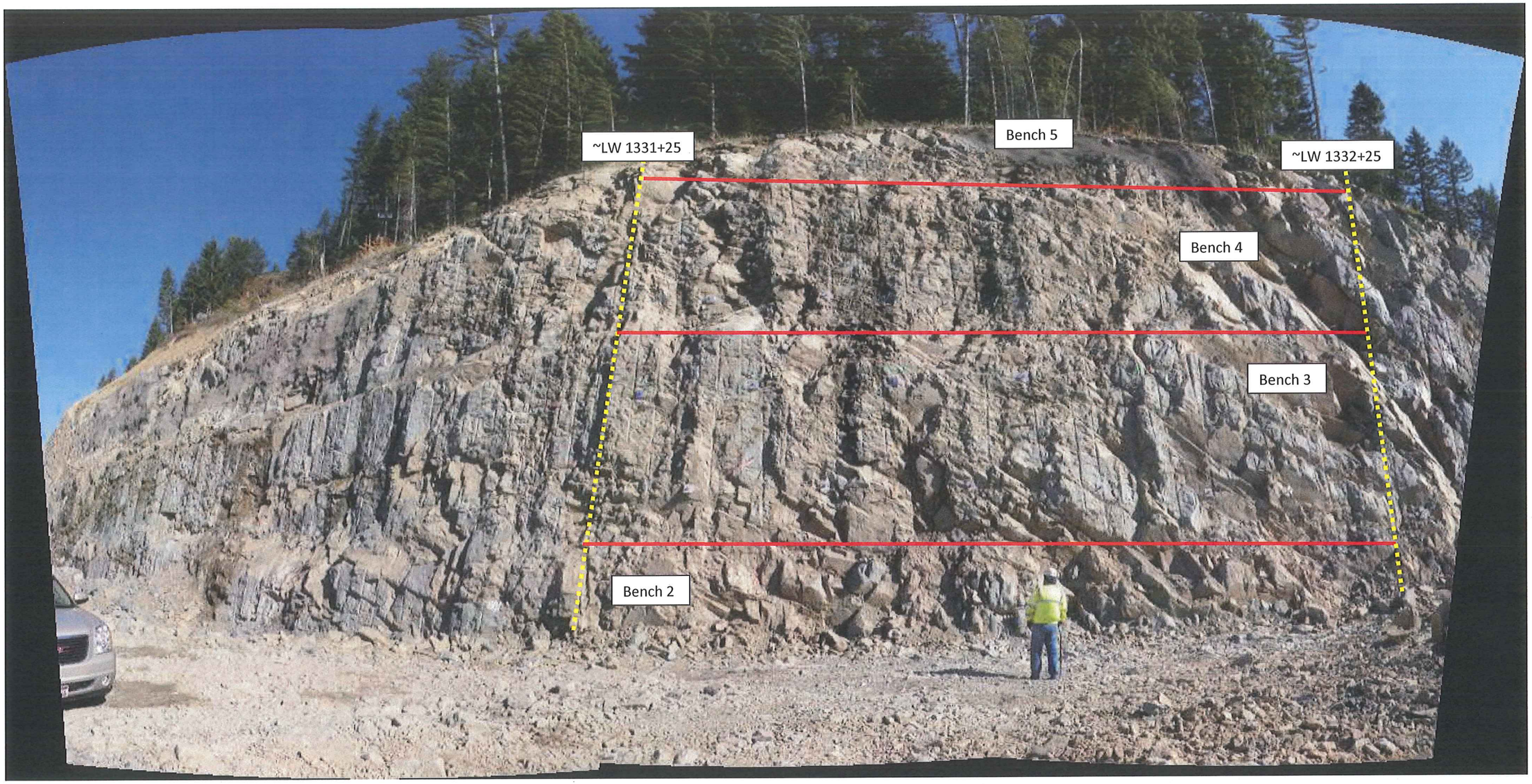

Figure 2. A photograph of the exposed rock cut from approximately LW 1330+50 to 1332+25.

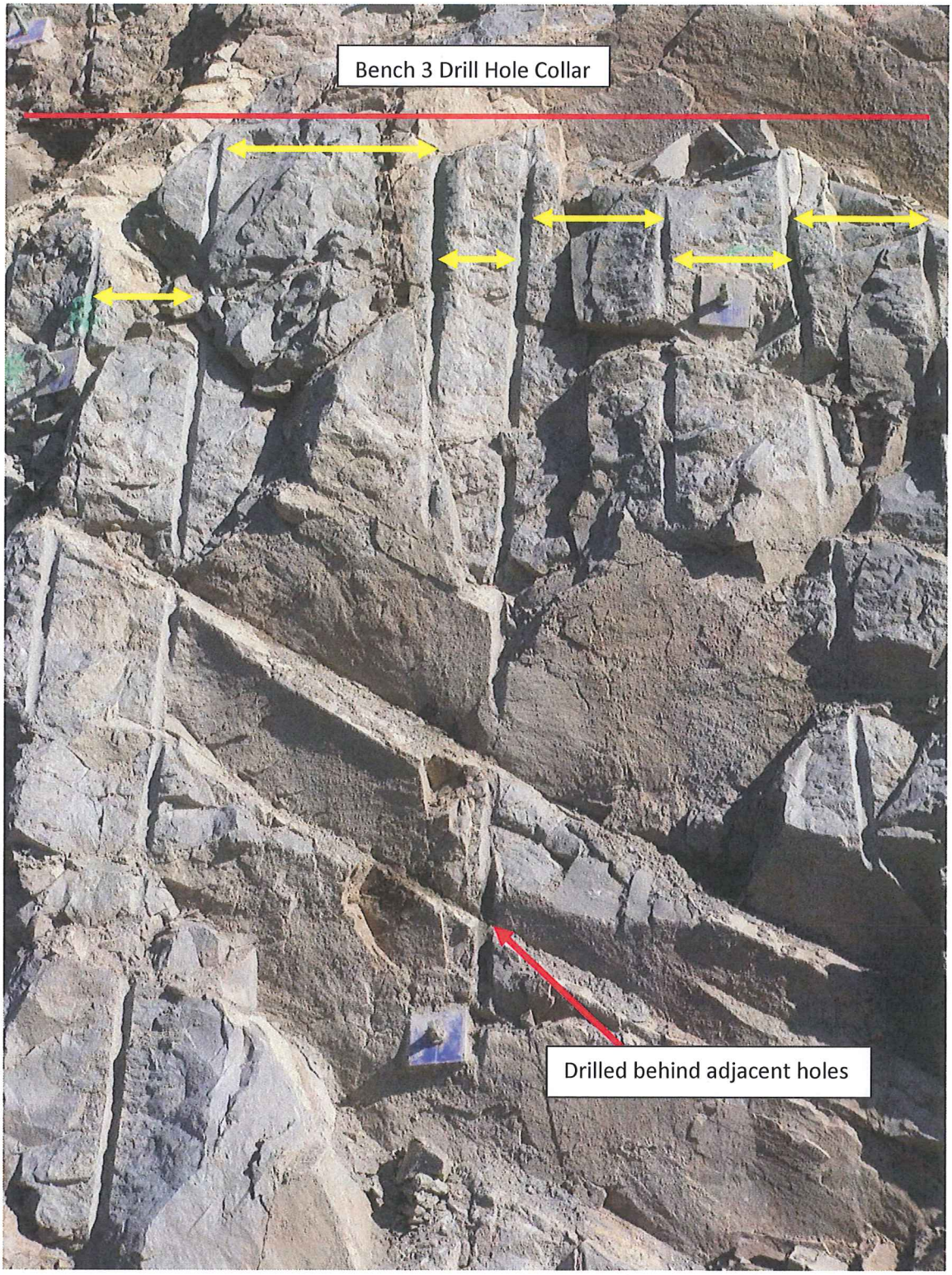

Figure 3. A close-up photograph showing the lack of care during drill hole setup that results in poor control in the preshear face at approximately LW Station 1331+75. Notice the inconsistent horizontal spacing at the drill-hole collar of the bench and the angles of the holes diving behind each other.

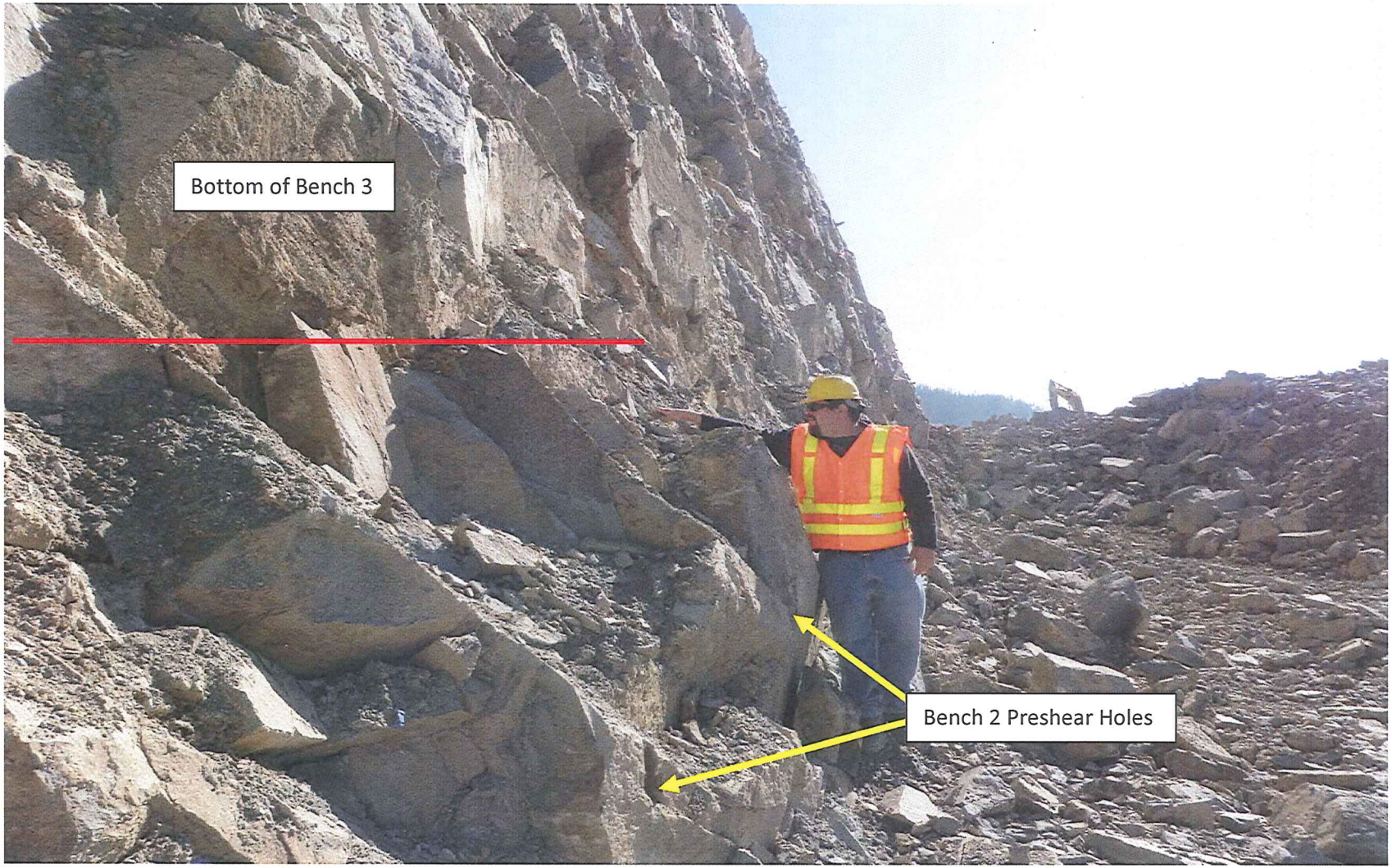

Figure 4. This photograph shows the unevenness at the bottom of Bench 3 where it transitions to Bench 2. Erik Warren is standing where the surveyors placed the back of bench 2 at the transition. There is approximately 6.5 feet of offset, which further indicates poor drill control.